

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION.

### Improvements in or relating to Cleaning and Sterilizing of Parts of Milking Apparatus.

We, NATIONAL RESEARCH DEVELOPMENT CORPORATION, a British Company, of 1 Tilney Street, London, W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the cleaning and sterilizing of parts of milking apparatus especially a "cluster" comprising a collector head with branch tubes carrying teat cups, the latter each comprising a shell with rubber liners therein. Milking apparatus having permanently fixed parts are generally cleaned in situ but other apparatus including in-can milkers (i.e. milking apparatus which convey the milk from the clusters through pipes directly into covered cans) are cleaned in the dairy. The term "can" as used herein is intended to include any form of container suitable for use with milking clusters.

The usual method of cleaning fixed installations is as follows:—

1. Immediately after milking 1—2 gallons of cold (or lukewarm) water is drawn through each installation from a bucket to remove the bulk of milk residues. This water is drawn through the usual releaser and then discharged.

2. Hot detergent solution is next drawn through the "clusters" and the milk cans are shaken by hand to assist cleaning. This solution is then drawn through the milk line and releaser and some collected in a bucket for hand brushing of the teat-cup liners. A final hot or warm flush with water is used to remove detergent residues from the apparatus.

3. The whole equipment is sterilized by passing steam through it in sections or alto-

gether, depending on steam supply available.

The cleaning of bucket and other portable apparatus is usually effected as follows:

1. Immediately after milking the clusters are rinsed by suction.

2. The parts are scrubbed in hot detergent solution, brushes and rods being used, at the morning milking.

3. The parts are steamed or treated for at least two minutes in chlorine containing solution.

In the evening all equipment is usually rinsed and treated with chlorine solution only.

Another method of cleaning clusters is by hanging them in a rack (normal way up) in such a way that the interior may be completely filled with one half per cent caustic soda solution or a two per cent solution of dairy detergent containing chlorine. The clusters are rinsed before use.

We apply the invention in conjunction with in-can milking for which it is possible to reduce milk-contact surfaces to the following clusters and can lids, equal to the number of milking units required, with two pieces of long rubber tubing per unit.

According to the present invention a method of cleaning a milking cluster and its cluster-to-can connecting tubes is characterised in that the cluster is suspended within a container with its branches and teat cups hanging downwards, the cluster-to-can connecting tube is mounted in the said container sloping continuously in the same sense from one end to the other of said tube, and the container is then immersed with the said cluster and tube mounted therein, in a bath of cleaning and/or sterilizing liquid, in an attitude such that the cleaning liquid fills the tube and the cluster without air pockets being formed therein.

[Price 3s. 0d.]

This method offers various advantages especially enabling all surfaces of the clusters to be effectively treated and facilitating the use of stronger cleaning solutions. There is also considerable saving in cost of cleaning equipment and labour.

We prefer to use an aqueous solution of 1 to 5 per cent (e.g. 3 per cent) by weight of caustic soda or caustic potash which is effective for fat removal from the rubber parts as well as otherwise cleaning and sterilizing at atmospheric temperature. The cluster in the inverted and vertical position may be removed from the solution whereupon the liquid will flow out and the cluster may then (while still so mounted) be immersed in a rinsing liquid.

The invention will now be described by way of example with reference to the accompanying diagrammatic drawings wherein:—

Figure 1 is an elevational view of the parts to be cleaned shown in their normal milking position;

Figure 2 shows an apparatus made in accordance with the invention for containing the parts to be cleaned;

Figure 3 is a view of one of the teat cups showing the teat cup shell in section and its liner and tube in elevation;

Figure 4 is a sectional view on the line 4—4 on Figure 3; and

Figure 5 is an elevational view of part of the can lid but showing its rubber gasket in section.

The cluster comprises a series of teat cups each having a shell 10 and a rubber liner 11, and a collector head 12 connected by tubes 13 to the liners. Tubes 14 connect the collector head to the shells.

The teat cup cluster is of such a form that the chamber between the liner and shell can be readily brought into free communication with cleaning liquid and rinse water. The collector head is attached in the usual way by means of a long milk tube 16 to a tube 17 attached to and passing for a short distance through the can lid 18 at an angle from the vertical. Tube 17 thus directs milk passing from a cow to a milk can to the wall of the can so preventing any churning of the milk. Also attached to the lid 18 is a vertical tube 20 to which may be attached a long rubber tube 21 for connecting the whole assembly to a source of vacuum.

In order that the whole of the apparatus shown in Figure 1 may be completely immersed and all parts contacted by the cleaning liquid, there is provided a container as illustrated in Figure 2.

The container has a cylindrical impermeable wall 23 and a foraminous base 24. A mounting member for carrying the cluster comprises a horizontal bar 25 within the container. The collector head is placed on

the bar 25 with the teat cups and pulsator tubes 13, 14 hanging down on opposite sides of the bar. A series of upstanding pins 26 are provided within and around the wall 23 secured thereto and spaced from the inner surface thereof a sufficient distance to form a space to receive the long rubber tubes 16, 21. The bar 25 is fixed to two of the pins 26. The diameter of the container may be such that each rubber tube extends over not more than about 360° around the axis of the container. A wire helix 27 constituting a supporting device for the tubes is mounted in said space to receive the first long rubber tube 16 and the other tube 21 may be disposed upon the first in continuously ascending manner so that liquid flows up the bores readily on immersion and again readily flows out when the container is lifted out of a tank of cleaning liquid.

The pins 26 extend up from the helix 27 (although not directly connected thereto) so as to hold the tubes 16, 21 on the helix 27.

The can lids may be packed on edge in the container between the bar 25 and the helix 27.

The container can be designed to contain two or more sets of parts such as shown in Figure 1.

The container has handles 28, 29, whereby it can be lifted and lowered into the tank (not shown) of cleaning or sterilizing liquid, this tank having a lid.

The metal parts of the cluster may be made of stainless steel or other material resistant to strong alkali solution and may be made from a forging having pressed in pipes for connection to the tubes 13 and 14. The can lid will also be made of stainless steel and may have two or three downwardly extending headed pins 30 (Figure 5) to be engaged in holes in a thick rubber gasket ring 31 which makes a vacuum tight connection with the can. The shanks 32 of these pins are slightly greater in length than the thickness of the gasket 31 so that when the lid is off the can, the gasket can move free from the lid. The rubber ring may therefore be left on the lid during cleaning as the cleaning solution can readily flush between the ring and the lid.

It is necessary to rinse the inner surfaces of the shells 10 and outer surfaces of the liners 11 free from cleaning solution before milking. This requires that both ends of the shell 10 should be open at the same time. This may be done by slipping the liner free from the shell and lodging it on two radial projections 35 on the tube 13 as shown in Figures 3 and 4.

The method of use of the apparatus (for cleaning two sets of the equipment shown in Figure 1) is as follows:—

Immediately after milking all the equip-

ment is rinsed free from milk, the long tubes are disconnected and packed one by one on the ascending helical support 27 and behind the retaining pins 26. The shells 10 are then slipped back on the milk tubes 13 beyond the projections 35, and the clusters then hung on the horizontal bar 25. The lids 18 are placed on edge in the container to the sides of the clusters. The container and contents are then transferred to an immersion tank, and left there until the gear is required again at the next milking. To prepare the equipment for use at the next milking the container is lifted clear of the immersion liquid and, after draining, the gear is removed from the container and rinsed. The liners are drawn into the shells and the clusters and lids joined by the necessary rubber tubes. The equipment is then ready for milking.

The immersion liquid is required to achieve three functions—to remove milk residues from the surfaces of the equipment, to prevent bacterial proliferation on these surfaces, and to prevent accumulation of large amounts of fat within the rubber of rubber parts. To these ends we have preferred to use a plain caustic soda solution of a strength ranging from 1 to 5%. This solution may conveniently be renewed after about 1 month. At this time also any undissolved material adhering to the equipment may be removed by dilute acid followed by brushing in an alkaline detergent solution. The accumulation of undissolved material on the milk-contact surfaces is undesirable because after a long period it may be found to harbour active bacteria. The deposition may be minimised by using soft or softened water, by compounding the caustic soda solution with calcium sequestering agents, or using other additives in the caustic solution.

What we claim is:—

1. A method of cleaning a milking cluster and its cluster-to-can connecting tube wherein the cluster is suspended within a container with its branches and teat cups hanging downwards, the cluster-to-can connecting tube is mounted in the said container sloping continuously in the same sense from one end to the other of said tube, and wherein the container is then immersed, with the said cluster and tube mounted therein, in a bath of cleaning and/or sterilizing liquid in an attitude such that the cleaning liquid fills the tube and the cluster without air pockets being formed therein.

2. A method as claimed in Claim 1 wherein the cluster-to-can connecting tube is mounted in helical disposition in the container whereby the said continuous slope is rendered uniform.

3. A method as claimed in Claim 1 or 2 wherein the liner of each teat cup is held

axially displaced from the shell of the teat cup during cleaning.

4. A method as claimed in any of the preceding claims wherein the liquid is an aqueous solution of 1 to 5 per cent by weight of caustic soda or caustic potash.

5. Apparatus for cleaning a milking cluster and its cluster-to-can connecting tube comprising a container having a mounting member adapted to support the collector head of the cluster and spaced from the bottom of the container by an amount sufficient to enable the branch tubes and teat cups of the cluster to hang freely downwards, and having a supporting device adapted to support the cluster-to-can tube in an attitude continuously sloping in the same sense from one end to the other of said tube.

6. An apparatus for cleaning a milking cluster and its cluster-to-can connecting tube comprising a circular container, a supporting device therein disposed helically around its inside surface so as to cause the tube mounted thereon to adopt helical formation, and a horizontal bar on which the cluster can be placed in an upside down position with teat cups on either side thereof.

7. An apparatus as claimed in Claim 5 or 6 wherein the supporting device comprises a wire extending over about 360° around the axis of the container disposed adjacent the wall of the container and pins extending up from a position just beneath the helical wire and spaced from the wall of the container to hold the tube on the wire whereby the said continuous slope is rendered uniform.

8. Apparatus as claimed in Claim 5 or 6 associated with a cluster in which the branch tubes connected to the teat cup liners have radial projections spaced from the liners a distance suitable for holding the liners and their shells slightly displaced axially.

9. Apparatus as claimed in Claim 5 having space between the supporting device and the mounting member to receive a milk can lid.

10. Apparatus as claimed in any of Claims 5 to 9 associated with a milk can lid having a resilient gasket connected thereto by headed studs having shanks longer than the thickness of the gasket.

11. Apparatus as claimed in any of Claims 5 to 10 wherein the container has a foraminated base.

12. Apparatus for cleaning milk clusters and their connecting tubes substantially as described with reference to Figure 2 of the accompanying drawings.

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## PROVISIONAL SPECIFICATION.

**Improvements in or relating to Cleaning and Sterilizing of Parts of Milking Apparatus.**

We, NATIONAL RESEARCH DEVELOPMENT CORPORATION, a British Company, of 1 Tilney Street, London, W.1, do hereby declare this invention to be described in the following statement:—

This invention relates to the cleaning and sterilising of parts of milking apparatus. Milking apparatus having permanently fixed parts are generally cleaned in situ but other apparatus including bucket plants and in-can milkers are cleaned in the dairy.

The usual method of cleaning fixed installations is as follows:—

1. Immediately after milking 1—2 gallons of cold (or lukewarm) water is drawn through each installation from a bucket to remove the bulk of milk residues. This water is drawn through the usual releaser and then discharged.

2. Hot detergent solution is next drawn through the "clusters" (collector head with branch pipes carrying the teat cups) and the milk receiving jars (if used) are shaken by hand to assist cleaning. This solution is then drawn through the milk line and releaser and some collected in a bucket for hand brushing of the teat-cup liners. A final hot or warm flush with water is used to remove detergent residues from the apparatus.

3. The whole equipment is sterilized by passing steam through it in sections or altogether, depending on steam supply available.

The cleaning of bucket and other portable apparatus is usually effected as follows:—

1. Immediately after milking the clusters are rinsed by suction.

2. The parts are scrubbed in hot detergent solution, brushes and rods being used, at the morning milking.

3. The parts are steamed or treated for at least two minutes in chlorine containing solution.

In the evening all equipment is usually rinsed and treated with chlorine solution only.

Another method of cleaning clusters is by hanging them in a rack in such a way that the interior may be completely filled with one half per cent caustic soda solution or a two per cent solution of dairy detergent containing chlorine. The clusters are rinsed before use.

According to the present invention the cluster is mounted in such a position that cleaning liquid can fill the rubber liners.

collector head and its branch pipes without air pockets, and the cluster is then completely immersed in a cleaning and/or sterilizing liquid.

This method offers various advantages especially enabling all surfaces of the clusters to be effectively treated and facilitating the use of stronger cleaning solutions. There is also considerable saving in cost of cleaning equipment and labour.

We prefer to apply the invention in conjunction with in-can milking and cooling for which it is possible to reduce milk-contact surfaces to the following—clusters and can lids, equal to the number of milking units required, with two pieces of long rubber tubing per unit. To ensure that the cleaning and sterilizing liquid reaches all surfaces these components may be packed in a basket with the clusters vertical and all bores of tubes with a continuous rise so that when the basket is lowered into liquid, air locking is avoided.

We prefer to use an aqueous solution of 3 to 6 per cent (e.g. 5 per cent) caustic soda or caustic potash which is effective for fat removal from the rubber parts as well as otherwise cleaning and sterilising at atmospheric temperature. The cluster in such position may be removed from the solution whereupon the liquid will flow out and the cluster may then (while still so mounted) be immersed in a rinsing liquid.

The churn lids and the long rubber tubes which connect the clusters to the churn lids may also be similarly mounted and immersed.

A mounting device for carrying the clusters may comprise a perforated basket provided with a horizontal bar on which the collector heads may be placed with the teat cups and pulsator tubes hanging down on opposite sides of the bar. The device is preferably cylindrical with imperforate sides but a foraminous base. A series of up-standing pins may be provided within and around the device spaced from the inner surface thereof a sufficient distance to form a space to receive the long rubber pipes. The diameter of the device may be such that each rubber pipe extends over not more than about 360°. A wire helix is mounted in said space to receive the first long rubber tube and one or more other such tubes may be disposed upon the first in continuously ascending manner so that liquid flows up the pipes readily on immersion and again

readily flow out when the device is lifted out of the tank of cleaning liquid.

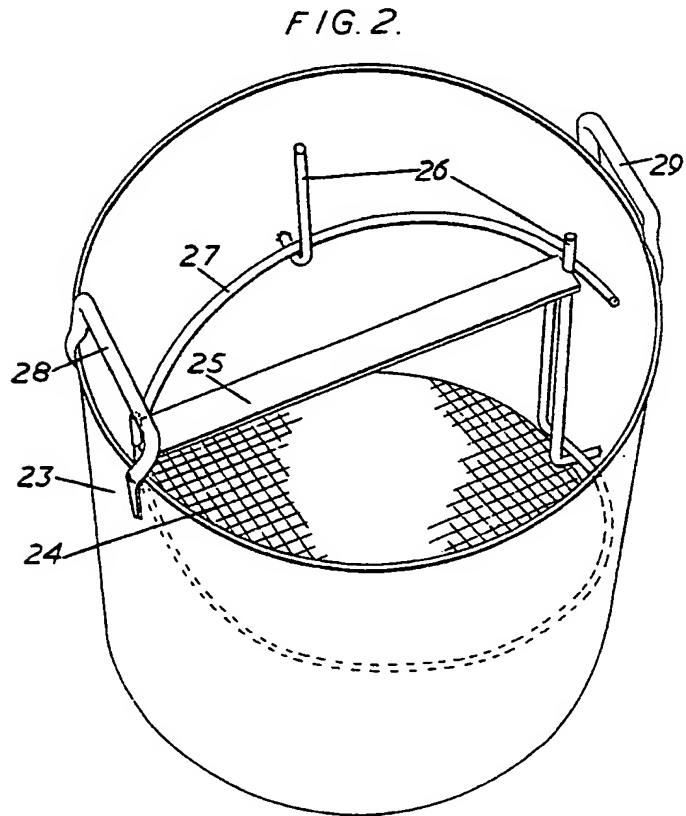
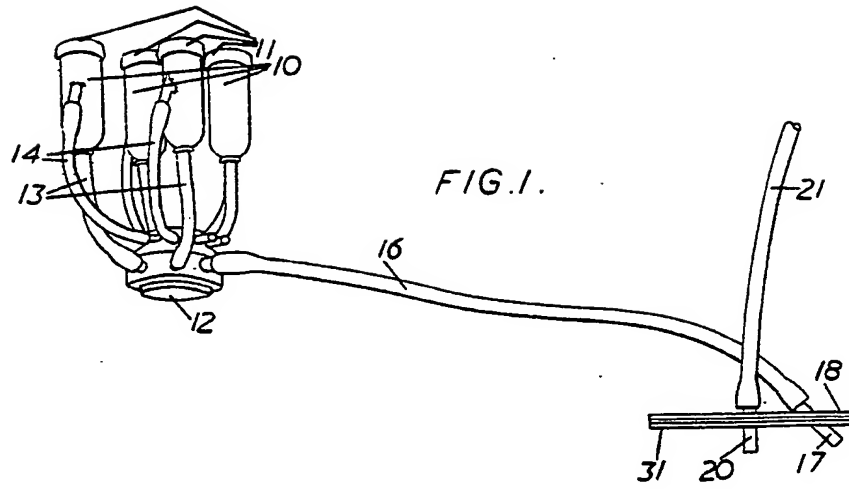
5 The churn lids can be packed in the basket with their usual inlet and outlet tubes vertical.

10 The cluster parts are made of more or less usual construction except that the metal parts are made of stainless steel or other material resistant to strong alkali solution and may be made from a forging for the collector head and pressed in pipes. The churn lid will also be made of stainless steel and may have two or three downwardly

extending headed pins to be engaged in holes in a thick rubber ring which makes 15 a vacuum tight connection with the churn. The rubber ring may be left on the lid during cleaning as the cleaning solution can readily flush between the ring and the lid.

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761,774  
2 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of  
the Original on a reduced scale.

SHEETS 1 & 2

